CLAIMS

1. An electrical energy storage device, comprising:

a microchannel plate (MCP) having channels formed therein, the channels having surface areas; and

thin films formed over the surface areas and defining an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode.

2. The device according to claim 1, wherein the MCP comprises a plurality of tubes, which are fused together and cut to define the MCP, the tubes having lumens, which define the channels.

3. The device according to claim 2, wherein the tubes comprise glass.

4. The device according to claim 2, wherein the tubes comprise carbon.

5. The device according to claim 1, wherein the MCP comprises a non-conductive material.

6. The device according to claim 5, wherein the non-conductive material comprises glass.

7. The device according to claim 1, wherein the MCP comprises a conductive material.

8. The device according to claim 7, wherein the conductive material comprises carbon.

9. The device according to any of claims 1-8, wherein the MCP has top and bottom surfaces, and wherein the thin films are further formed over at least one of the top and bottom surfaces.

10. The device according to any of claims 1-8, wherein the thin films comprise at least one current collector layer.

11. The device according to claim 10, wherein the current collector layer comprises at least one of nickel and copper.

12. The device according to any of claims 1-8, wherein the thin films comprise a final layer, which is formed so as to fill the channels.

13. The device according to any of claims 1-8, wherein the solid electrolyte comprises a hybrid polymer electrolyte.

14. The device according to any of claims 1-8, wherein one of the anode and the cathode comprises a lithium compound.

15. The device according to any of claims 1-8, wherein the cathode comprises a sulfur compound.

16. The device according to any of claims 1-8, wherein the thin films are fabricated so as to define a primary battery.

17. The device according to any of claims 1-8, wherein the thin films are fabricated so as to define a rechargeable battery.

18. The device according to claim 17, wherein the rechargeable battery comprises a Li-ion rechargeable battery

19. An electrical energy storage device, comprising:

a substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas; and

thin films formed over the surface areas and defining an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode, the thin films comprising a final layer, which is formed so as to fill the channels.

20. The device according to claim 19, wherein the substrate comprises at least one of a non-conductive material, a semiconductor material, and a conductive material.

21. The device according to claim 19 or 20, wherein the substrate has top and bottom surfaces, and wherein the cavities are formed so as to pass through the substrate from the top to the bottom surface.

22. The device according to any of claims 19 or 20, wherein the substrate has top and bottom surfaces, and wherein the thin films are further formed over at least one of the top and bottom surfaces.

23. The device according to any of claims 19 or 20, wherein the thin films comprise at least one current collector layer.

24. The device according to any of claims 19 or 20, wherein the solid electrolyte comprises a hybrid polymer electrolyte.

25. An electrical energy storage device, comprising:

a substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas, the substrate defining a first electrode; and

thin films formed over the surface areas and defining a second electrode and a solid electrolyte disposed between the first and second electrodes.

26. The device according to claim 25, wherein the first electrode comprises an anode, and the second electrode comprises a cathode.

27. The device according to claim 25, wherein the first electrode comprises a cathode, and the second electrode comprises an anode.

28. The device according to claim 25, wherein the substrate comprises a carbon material.

29. The device according to claim 28, wherein the carbon material comprises diamond.

30. The device according to claim 25, wherein one of electrodes comprises a lithium compound.

31. The device according to claim 25, wherein the thin films comprise a final layer, which is formed so as to fill the cavities.

32. The device according to claim 25, wherein the thin films comprise at least one current collector layer.

33. The device according to any of claims 25-32, wherein the substrate has top and bottom surfaces, and wherein the cavities are formed so as to pass through the substrate from the top to the bottom surface.

34. The device according to any of claims 25-32, wherein the substrate has top and bottom surfaces, and wherein the thin films are further formed over at least one of the top and bottom surfaces.

35. An electrical energy storage device, comprising:

a tube, having a channel passing therethrough, the channel having a surface area; and

thin films formed over the surface area and defining an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode.

36. A microelectronic device, comprising:

a substrate;

a microcircuit disposed on the substrate; and

a microbattery disposed on the substrate and coupled to provide electrical power to the microcircuit, the microbattery comprising:

a microchannel plate (MCP) having channels formed therein, the channels having surface areas; and

thin films formed over the surface areas and defining an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode.

37. A microelectronic device, comprising:

a microchannel plate (MCP) having channels formed therein, the channels having surface areas;

a microcircuit disposed on the MCP; and

thin films formed over the surface areas of at least some of the channels and defining an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode, the thin films being coupled to provide electrical power to the microcircuit.

38. A microelectronic device, comprising:

a microcircuit;

a substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas; and

thin films formed over the surface areas and defining an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode, the thin films comprising a final layer, which is formed so as to fill the channels, the thin films being coupled to provide electrical power to the microcircuit.

39. The device according to claim 38, wherein the microcircuit is disposed on the substrate.

40. A microelectronic device, comprising:

a device substrate;

a microcircuit disposed on the device substrate; and

a microbattery disposed on the device substrate and coupled to provide electrical power to the microcircuit, the microbattery comprising:

a battery substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas, the substrate defining a first electrode; and

thin films formed over the surface areas and defining a second electrode and a solid electrolyte disposed between the first and second electrodes.

41. A microelectronic device, comprising:

a substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas, the substrate defining a first electrode;

a microcircuit disposed on the substrate; and

thin films formed over the surface areas of at least some of the channels and defining a second electrode and a solid electrolyte disposed between the first and second electrodes, the thin films and substrate being coupled to provide electrical power to the microcircuit.

42. A method for fabricating an electrical storage cell, comprising:

providing a microchannel plate (MCP) having channels formed therein, the channels having surface areas; and

forming thin films over the surface areas so as to define an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode.

43. The method according to claim 42, wherein the MCP comprises a plurality of tubes, which are fused together and cut to define the MCP, the tubes having lumens, which define the channels.

44. The method according to claim 43, wherein the tubes comprise glass.

45. The method according to claim 43, wherein the tubes comprise carbon.

46. The method according to claim 42, wherein the MCP comprises a non-conductive material.

47. The method according to claim 46, wherein the non-conductive material comprises glass.

48. The method according to claim 42, wherein the MCP comprises a conductive material.

49. The method according to claim 48, wherein the conductive material comprises carbon.

50. The method according to any of claims 42-49, wherein the MCP has top and bottom surfaces, and wherein forming the thin films further comprises forming the thin films over at least one of the top and bottom surfaces.

51. The method according to any of claims 42-49, wherein forming the thin films comprises forming at least one current collector layer.

52. The method according to claim 51, wherein the current collector layer comprises at least one of nickel and copper.

53. The method according to any of claims 42-49, wherein forming the thin films comprises forming a final layer so as to fill the channels.

54. The method according to any of claims 42-49, wherein the solid electrolyte comprises a hybrid polymer electrolyte.

55. The method according to any of claims 42-49, wherein one of the anode and the cathode comprises a lithium compound.

56. The method according to any of claims 42-49, wherein the cathode comprises a sulfur compound.

57. The method according to any of claims 42-49, wherein forming the thin films comprises fabricating the thin films so as to define a primary battery.

58. The method according to any of claims 42-49, wherein forming the thin films comprises fabricating the thin films so as to define a rechargeable battery.

59. The method according to claim 58, wherein the rechargeable battery comprises a Li-ion rechargeable battery.

60. A method for fabricating an electrical storage cell, comprising:

providing a substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas; and

forming thin films over the surface areas so as to define an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode, the thin films comprising a final layer, which is formed so as to fill the channels.

61. The method according to claim 60, wherein the substrate comprises at least one of a non-conductive material, a semiconductor material, and a conductive material.

62. The method according to claim 60 or 61, wherein the substrate has top and bottom surfaces, and wherein the cavities are formed so as to pass through the substrate from the top to the bottom surface.

63. The method according to claim 60 or 61, wherein the substrate has top and bottom surfaces, and wherein forming the thin films further comprises forming the thin films over at least one of the top and bottom surfaces.

64. The method according to claim 60 or 61, wherein the thin films comprise at least one current collector layer.

65. The method according to claim 60 or 61, wherein the solid electrolyte comprises a hybrid polymer electrolyte.

66. A method for fabricating an electrical storage cell, comprising:

providing a substrate having a multiplicity of cavities formed therein, the cavities having an aspect ratio greater than one and having surface areas, the substrate defining a first electrode; and

forming thin films over the surface areas so as to define a second electrode and a solid electrolyte disposed between the first and second electrodes.

67. The method according to claim 66, wherein the first electrode comprises an anode, and the second electrode comprises a cathode.

68. The method according to claim 66, wherein the first electrode comprises a cathode, and the second electrode comprises an anode.

69. The method according to claim 66, wherein the substrate comprises a carbon material.

70. The method according to claim 69, wherein the carbon material comprises diamond.

71. The method according to claim 66, wherein one of the electrodes comprises a lithium compound.

72. The method according to claim 66, wherein forming the thin films comprises forming a final layer so as to fill the cavities.

73. The method according to claim 66, wherein forming the thin films comprises forming at least one current collector layer.

74. The method according to any of claims 66-73, wherein the substrate has top and bottom surfaces, and wherein the cavities are formed so as to pass through the substrate from the top to the bottom surface.

75. The method according to any of claims 66-73, wherein the substrate has top and bottom surfaces, and wherein forming the thin films further comprises forming the thin films over at least one of the top and bottom surfaces.

76. A method for fabricating an electrical storage cell, comprising:

providing a tube having a channel passing therethrough, the channel having a surface area; and

forming thin films over the surface area so as to define an anode, a cathode, and a solid electrolyte disposed between the anode and the cathode.